DOCUMENT RESUME

ED 217 884 IR 010 270

AUTHOR Allard, Kim E.
TITLE The Videodisc and Implications for Interactivity.
PUB DATE Mar 82
NOTE 11p.; Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, March 19-23, 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Programs; Instructional Development; *Microcomputers; *Online Systems; Special Education; *Videodisc Recordings; *Video Equipment; Videotape Recordings
IDENTIFIERS *Intelligent Video; Interactive Videodisc Special Education Technology

ABSTRACT

This review of videodisc technology and its potential for use in conjunction with microcomputers in the development of interactive instructional systems includes: a brief discussion of the background and current state-of-the-art of videodisc technology; a review of videodisc formats and the costs and advantages of particular formats in the development of interactive educational systems; an outline of the unique instructional capabilities of interactive videodisc systems; a description of the Interactive Videodisc for Special Education Technology (IVSET) project, the equipment it employs, and the types of instructional materials it has produced for mentally handicapped non-readers; an account of the processes involved in developing and producing a videodisc for instructional purposes; and a concluding statement on the potential of the videodisc as an educational tool. (JL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED217884

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

THE VIDEODISC AND IMPLICATIONS FOR INTERACTIVITY

Kim E. Allard
Utah State University

Paper presented at the Annual Meeting of the American Educational Research Association, New York City, March 1982.

IR010270

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kim E. Allard

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Videodisc technology was developed in the 1960-1970's and was first demonstrated in the United States in 1971 with the first videodisc player being made commerically available in 1978. Popular entertainment films including most of Universal Studio's recent titles and rock concerts were the first programs to be converted to the videodisc format. Since that time the use of the videodisc as an entertainment medium has burgeoned. Educators recognized early the potential of the videodisc medium for computer assisted instruction. Most computer assisted instruction has been limited by its ability to only present textual material and computer graphics. The videodisc with its capacity to provide demonstrations using quality video images can present high quality simulation when combined with a microprocessor. (Schneider and Bennion, 1981).

One of the features of the videodisc medium that is vital to the use of the disc for instruction is the quality of the image in the freeze frame or pause mode. When videotape is paused a jittery video image is generally the result. The videodisc, however, provides a rock steady high quality picture. In addition, the player is capable of searching from one end of the videodisc to the other in approximately 3 seconds. This fast access time allows for rapid retrieval and presentation of video segments. Some of the original excitement with videodisc technology centered around the amount of material that can be stored on one side of a videodisc. Each videodisc is comprised of 54,000 separate video pictures or frames with each picture having its own unique address or location. This enormous storage capacity makes the videodisc an incredibly powerful storage medium particularly for archival uses. (Mole, 1981). An often heard claim is that the Encyclopedia Britannica can be stored on a videodisc and indeed this is true. The storage value of these 54,000 frames, however, diminishes greatly when we realize that to utilize the audio capability of the videodisc, we must spin it at 1800 RPM's. This results in 30 frames of video speeding by each second for a total of 30 minutes

of real motion per videodisc side.

VIDEODISC FORMATS

Currently two videodisc formats are generally available. They are the laser optical system and the capacitance electronic disc. The player used in our application is an industrial type laser optical player. This player reads the videodisc using a laser so there is no physical contact with the videodisc itself. The Laser Vision player is one of the consumer models of the laser optical players. In the capacitance electronic disc or CED system, a stylus actually tracks the videodisc similar to the way in which a phonograph needle reads a record album. The videodisc currently being marketed by RCA is a CED system. Another format, VHD (video high density) is being introduced in the home market soon. It will be similar to the CED player with a few additional options. None of these videodisc formats are compatible with each other. This compatibility dilemma is similar to the one faced by videotape users in choosing between VHS, Beta and 3/4" formats. To briefly describe the differences between systems, the industrial model laser optical players which sell for approximately $2,000 are specifically designed for external computer control and for long term extensive use. The less expensive consumer or home model laser optical player can currently be interfaced with a computer, but is not as rugged a player for extended use. These players currently retail for $700-$800.

The capacitance electronic disc system was designed strictly for the home market to use entertainment discs. The players are not built for extended long term use and do not have provision for external computer control. These players currently retail for approximately $500.00.

Most laser optical videodisc players can be used interactively either in a stand alone mode or interfaced with some type of computer. Most industrial model laser optical videodisc players currently on the market have a microprocessor with one kilobyte of memory and a programmable remote control unit. You may store programming commands in the videodisc player's memory and then

run the program and interact with it all through the remote control unit. These manually entered programs are stored in the player's memory until the player is reset or the storage space is reused. The major advantage of this manual entry programming is the ease with which a program can be changed. The disadvantages, however, include being able to use only one kilobyte of memory and the possibility of error in manually entering the data each time you wish to use the program with a different player.

A second method of making a videodisc interactive involves taking the same program or programs you would enter manually into the player's memory and storing them on your videodisc. In this case, the program is loaded into the player's memory directly from the disc. The program is run and then another program stored on the disc can be loaded into memory and run. This inclusion of multiple programs on the videodisc alleviates the difficulties encountered in trying to fit a complex program into 1K of memory. Each program stored on the videodisc uses approximately 2 seconds on the second audio track. Theoretically, this allows for use of as many program dumps as necessary. Because the program dumps as they are referred to are permanently stored on the videodisc, there is not the same possibility of error in manual data entry. Once the program has been correctly stored on the videodisc it cannot be changed. This same feature, however, results in the major disadvantage of preprogrammed videodiscs. Once the program dumps have been placed on the videodisc, they cannot be modified. Changes can be made to the program once it is loaded into the videodisc player's memory, however, this is cumbersome and would have to be done each time a new program "dump" occurs.

A third method of achieving interaction with a videodisc involves interfacing the videodisc player with a computer. The system we presently use has an external microcomputer rather than the internal microprocessing capabilities of the videodisc player. The use of an external microcomputer allows the instructional developer flexibility and capabilities impossible to achieve with

either hand entered or dumped programs. Most microcomputers interfaced with videodiscs provide at least 48K of on line memory and the addition of disk drives for storage further extend the system software capability. In addition to increased memory, using an erasable storage medium, such as floppy diskette, allows for relatively simple computer software modification. In research and development mode this potential for modification is crucial. The potential for modification becomes even more important when we look at it in terms of the "read only" limitations of the videodisc. Because a videodisc cannot be changed after being pressed, computer software modification is often the only flexible component in the interactive videodisc program. This variable however, should not be underestimated. By modifying the computer software, instructional presentation can be resequenced, feedback can be changed within limits and criteria levels can be adjusted. Record keeping and data collection are also an important feature of the microcomputer/videodisc system. An external microcomputer allows for systematic and complex data collection. Our present system collects and records student data on a floppy diskette. Each time the student uses the system, his/her own STUDENT DATA DISKETTE is inserted in one of the disk drives and data is cumulatively collected. These data are easily retrieved for data analysis. These analysis can include determining percentages and mean scores, item analysis, error patterns and reliability coefficients. While many of these analyses may not always be of practical use in the classroom, they have considerable value for research and development.

An additional advantageous feature of the computer controlled videodisc involves the teacher/user directly. Based on computer memory storage limitations, a preprogrammed videodisc cannot give the teacher a great deal of control over the instruction. In a computer controlled interactive system, the teacher/user can tailor certain package variables to the individual student. These variables might include mastery level criteria, length of student sessions or length of

time a student is given to respond. This type of flexibility requires considerable expertise for the potential teacher/user. Extensive teacher prompting currently available only in a system with more than the memory storage of today's videodisc player will simplify operation.

THE IVSET PROJECT

Our project presently uses a videodisc under external computer control. The project, dubbed the Interactive Videodisc for Special Education Technology project, began approximately three years ago when Utah State University purchased one of the few prototype videodisc players made available to higher education institutions. An interface was designed to allow the microcomputer and videodisc to communicate with each other. After a pilot project resulted in the development of an instructional program for mentally handicapped non-readers, grants for the development of additional programs were awarded through the Office of Special Education.

The hardware components of the IVSET system include an industrial model DiscoVision 7820 laser optical videodisc player, an Apple II microcomputer with 48K of RAM and two floppy disk drives, a 12" television monitor, a light interrupt touch panel and the microcomputer/videodisc interface card. The hardware configuration allows us to present instructional material using video from the videodisc with or without audio as well as computer generated graphics or text from the microcomputer with or without audio from the videodisc. Additionally, we have had experience superimposing computer generated graphics from the microcomputer over the video image from the videodisc. While this overlaying technique is possible at this time, the technology is still not sophistocated enough to make the technique practical in this particular hardware configuration.

The instructional packages developed by the project differ from most other interactive video programs. Most interactive video combines text with

video material to present instruction. Because our population was not capable of reading text on a screen, the videodisc provides most of the instruction through the use of the two audio tracks. The learner interacts with the system by touching the television screen. This interrupts two light beams and sends x and y coordinates to the microcomputer for comparision with stored coordinates. Based on the evaluation of these coordinates, feedback is presented and the student is branched to new instruction or remediation.

VIDEODISC DEVELOPMENT

Videodisc development requires systematic instructional development on the part of a team of persons. The individuals include at least one content person, computer programmer, instructional developer and production coordinator. While no person needs to be well versed in all areas of development, each one should have a global understanding of videodisc technology and its potential. Development follows a slightly revised instructional development model with team members contributing in varying amounts based on their involvement in each developmental phase.

In scripting for a videodisc production, we have used several scripting forms based on each program's needs. The scripting format itself is not critical to the development process. Almost any audio visual scripting sheet will do. What is critical, however, is the need for a standardized format from which everyone involved in the videodisc development can work. During scripting, software requirements should be discussed at length. It is vitally important that each team member realize that the computer or videodisc is not going to do anything it is not told to do. Each instructional feature needed must be incorporated into the computer software preferably in the computer software design stage.

The video production people should not be underemphasised in the script writing and videodisc design phase. Although the videodisc can search rapidly and be programmed to present material in a variety of ways, proper placement

of segments on the disc will provide optimal use. Search times and breaks for branching can be minimized if desired and audio visual storage can often be maximized by strategic placement of segments and utilization of both audio tracks.

Actual production for the videodisc involves transferring existing materials or generating new material on at least 1" broadcast quality videotape. One half inch videotape format simply will not suffice. A 3/4" format has in the past been acceptable by some disc producing companies, however, use of anything less than 1" videotape is discouraged. A rule of thumb in videotaping for a potential videodisc is: Every flaw or weakness in your videotape will be gloriously enhanced by going to the videodisc format. 16mm film can also be used as a source medium for videodisc production. Generally, 16mm film is preferred when a great deal of motion is involved and the amount of motion jitter in the freeze frame or pause mode should be minimized.

Once you have produced a high quality videotape, it must be sent to a videodisc production facility for transfer to the disc format. Currently, this is being done by DiscoVision Associates or Pioneer in California and 3M in Wisconsin. Turn around time on having a videodisc pressed is estimated to be about 6 weeks. The cost for pressing one side of a videodisc (approximately 30 minutes) is approximately $2,000 with an additional $10/disc charge although this varies radically based on the videodisc producer, source media format, number of copies produced and if any program dumps are included on the videodisc. If you are producing a videodisc containing program dumps, you should elect to purchase both "check" and "proof" discs. These discs allow you to check branching logic and programming for error before pressing multiple copies.

CONCLUSION

Although still in it's infancy videodisc technology provides great potential

for educators and researchers. As we look at the current state of the technology, it is important to note that production and programming costs are slowly dropping while at the same time the technology is advancing. This trend may soon put interactive videodisc instruction within the reach of all those desiring it.

REFERENCES

Mole, D. The videodisc as pilot project of the public archive of Canada. Videodisc/Videotext, 1981, 1(3), 154-161.

Schneider, E. W. and Bennion, J. L. Videodiscs. Englewood Cliffs, N. J. Educational Technology Publications Inc., 1981.